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The Cauchy Transform

**Joseph A. Cima
Alec L. Matheson
William T. Ross**



American Mathematical Society

Preface

This book is a survey of Cauchy transforms of measures on the unit circle. The study of such functions is quite old and quite vast: quite old in that it dates back to the mid 1800s with the classical Cauchy integral formula; quite vast in that even though we restrict our study to Cauchy transforms of measures supported on the circle and not in the plane, the subject still makes deep connections to complex analysis, functional analysis, distribution theory, perturbation theory, and mathematical physics. We present an overview of these connections in the next chapter.

Though we hope that experienced researchers will appreciate our presentation of the subject, this book is written for a knowledgeable graduate student and as such, the main results are presented with complete proofs. This level of detail might seem a bit pedantic for the more experienced researcher. However, our aim in writing this book is to make this material on Cauchy transforms not only available but *accessible*. To this end, we include a chapter reminding the reader of some basic facts from measure theory, functional analysis, operator theory, Fourier analysis, and Hardy space theory. Certainly a graduate student with a solid course in measure theory, perhaps out of [182], and a course in functional analysis, perhaps out of [49] or [183], should be adequately prepared. We will develop everything else.

Unfortunately, this book is not self-contained. We present a review of the basic background material but leave the proofs to the references. The material on Cauchy transforms is self-contained and the results are presented with complete proofs.

Although we certainly worked hard to write an error-free book, our experience tells us that some errors might have slipped through. Corrections and updates will be posted at the web address found on the copyright page.

We welcome your comments.

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